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# SCREEN DISPLAY METHOD

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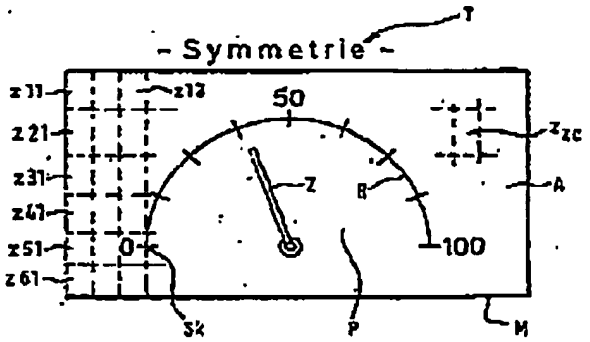
[Abstract]

Method for representing display values, especially the values of appropriate tuning or set parameters, on a screen of an electronic device by means of a character-generating device, which enables the representation of a plurality of characters ($z_{cz}$) to be reproduced, wherein the content of the individual characters ($z_{cz}$) can be programmed arbitrarily pixel by pixel by means of a data sequence and the characters can be retrieved individually or in groups by means of an address.

The representation of the individual display values here corresponds to a pointer (Z) with a pointer position that is variable relative to a position display area (P).




Key: T Symmetry

The invention relates to a method for representing display values, especially the values of appropriate tuning or set parameters, on a screen of an electronic device. This device can be, for example, a television receiver, a computer, or a monitoring device in industrial, commercial, medical, or some other field. In these cases, the display values include measurement, tuning, or set parameters or other values to be displayed by means of a screen. Here, advantageously character-generating devices are used, which enable a plurality of characters to be reproduced, wherein the content of the individual characters, which are built from a fixed number of pixels in the form of a matrix, can be programmed arbitrarily pixel by pixel by means of a data sequence at least before production. By means of an address, the characters can be retrieved individually or in groups as data from a memory device. The data is used to form control signals, which then modulate the electron beam or beams for writing the appropriate character for the typical grid-like beam deflection according to the appropriate pixel position. One example for such a display method is described in Laid-open Patent No. DE 29 20 023. In this publication, the values to be displayed are represented either numerically and/or graphically as bars by means of a sequence of equal characters. Modern character-generating devices can also be programmed via special data inputs after production and the formation of individual characters is thus left to the decision of the device manufacturer as long as the number of addresses is sufficiently large.

A disadvantage for the display method according to DE 29 20 023 and for other known methods is that the optical display is very schematic, especially when the display concerns analog pointer instruments, rotary knobs, or slider controls. Therefore, the problem of the invention is to present a display method, for which the display enables an improved representation of analog values.

The problem is solved according to the invention in that the representation of display values is realized by means of individual characters or characters retrieved in groups, whose

character contents symbolize a pointer, and a variable pointer position corresponds to the appropriate display value within a position display region that can be covered by the pointer.

To emphasize the position display region that can be covered by the pointer (in the following text shortened to value region), this value region can be differentiated from the surrounding field through structure, color, or brightness. Furthermore, through scaling characters, a division or emphasis of certain display regions can be achieved. This is also possible through different color or brightness forms. Because a separate pointer is used for representing the display value, the form of the dynamic range as such can be chosen freely. In the extreme case, this can be transparent, especially when end marks are present. Such a transparent display would be far less disruptive in the image reproduction than the known bar displays.

The formation of scaling characters, especially for special values to be emphasized, is simple with the use of the character-generating device; likewise the representation of alphanumeric or other characters or symbols for identifying the scaling. Obviously, in this way the display as such can also be specified by means of a heading or caption in given arbitrary language.

Through the grouped addressing of characters, fixed display regions, which are independent of the appropriate display value, can be retrieved for the display. Another grouped addressing then refers just to the position of the pointer. For example, if the pointer position is to be changed in steps of 2%, then 51 addresses are sufficient for all of the position displays within the dynamic range of 0% to 100%. These position addresses can be used for any display parameter. The designation of the displayed value can also be replaced if necessary.

The pointer representation becomes particularly simple when the pointer is represented on the screen not as an angle-dependent parameter, but instead essentially in the form of a one-dimension representation, which also corresponds to looking at a slider control. Here, in contrast to a bar representation, only the actual pointer region is important, which is represented as a relatively small planar pointer. The structure of the one-dimensional position display region is thus not fixed. The entire position display region and thus also the dynamic range can be divided by means of a shape, color, or brightness form or it can also remain transparent. By means of a change in shape, color, or brightness in the pointer, displays can be realized by means of a positive or negative deviation from a desired value or a previous tuning or set value. For example, a deviation above the desired value can be represented by the color red and a deviation below the desired value can be represented by the color blue. Especially preferred is the one-dimensional representation form, when several position display regions are to be represented simultaneously, for example, for the setting of an equalizer by means of a remote control. Then, in a typical way, the position of the individual slider control reproduces the appropriate

frequency response. By means of shape, color, or brightness changes in the pointer or in the display regions, a cursor function is realized. The one-dimensional orientation is better in the vertical screen display direction.

The invention and advantageous configurations are explained now with reference to embodiments from Figures 1 and 2:

Figure 1 shows schematically a representation with angle-dependent pointer position and

Figure 2 shows schematically a representation with one-dimensional pointer position.

The representation from Figure 1 is formed from a matrix M of c x z characters, wherein c defines the horizontal number and z the vertical number of individual characters $z_{zc}$. A fixed display region A is independent of the pointer position and thus can be used for all display values and also all display parameters. A variable position display region P is dependent on the value of the appropriate display parameter and contains the pointer Z with its variable angular position. If the angular position is to be represented in steps of 2%, then the associated region of matrix M is retrieved by means of one of 51 addresses. Furthermore, in Figure 1, the dynamic range P is shown as semicircle H. The positions 0%, 50%, 100% and others are marked by scaling characters Sk and provided with numbers by means of number characters within the matrix M. As an exchangeable heading or title T, the term "symmetry," "balance," or another term for the display value to be displayed, is represented by alphanumeric characters.

The representation from Figure 2 corresponds to a one-dimensional projection of Figure 1. In the limiting case, the associated matrix M is composed of only a single character row. The programming is thus very simple and requires less memory space. A single character, which corresponds approximately to an elongated rectangle, is used in the embodiment as pointer Z. Other pointer shapes, such as squares, triangles, diamonds, arrows, etc., can also be freely selected according to the available character space. In Figure 1, the position display region P is a horizontal rectangle and defines in the horizontal direction the appropriate position of the pointer Z. With a bar representing the display value, it has merely its outer shape in common. In Figure 2, the region P represents the overall dynamic range, which is independent of the size of the appropriate value to be displayed. Thus, it has only a subordinate function and can also remain transparent, as already mentioned, so that the actual image is barely disturbed on the screen. This is impossible for a bar display. As in Figure 1, scaling characters Sk and their numbering are also shown. They are assigned to the fixed display region A. "Volume" is given as an example for an exchangeable title T. Coloring of the position display region P or a change in its shape as a function of the volume value can further signify the function. Examples include coloring the position display region P between 0% and 100% from blue or green to red or making the position display region P very narrow at value 0% and increasing it significantly in width up to the value

of 100%. A suitable matrix M can be programmed for this purpose, although then a single character row is no longer sufficient.

Claims

1. Method for representing display values, especially the values of appropriate tuning or set parameters, on a screen of an electronic device by means of a character-generating device, which enables the representation of a plurality of characters to be reproduced, wherein the contents of the individual characters ($z_{cz}$) can be programmed arbitrarily pixel by pixel by means of a data sequence and the characters can be retrieved by means of an address, characterized in that the character contents of the individual characters or characters that can be retrieved in groups symbolize a pointer (Z) and a variable pointer position corresponds to the appropriate display value within a position display region (P) that can be covered by the pointer (Z).

2. Method according to Claim 1, characterized in that at least one part of the position display region (P), which can be covered by the pointer (Z), is differentiated from the surrounding field of the screen by structure, color, or brightness.

3. Method according to Claim 2, characterized in that the position display region (P) that can be covered by the pointer (Z) is divided by at least one scaling character (Sk), wherein an average value or a desired value or an already provided value is defined especially by means of a scaling character.

4. Method according to Claim 3, characterized in that the scaling character (Sk) defines the maximum position display region (P) that can be covered by means of an end mark.

5. Method according to Claim 2, 3, or 4, characterized in that the position display region (P) that can be covered is proportional to the absolute value of the display value.

6. Method according to one of Claims 1-5, characterized in that the pointer (Z) and the associated position display region (P) that can be covered are realized essentially in the form of a one-dimensional representation (Figure 2) on the screen.

7. Method according to Claim 6, characterized in that the pointer (Z) is represented by a relatively small planar character in relation to the one-dimensional representation of the display region.

8. Method according to Claim 6 or 7, characterized in that the arrangement of the pointer (Z) and the appropriate position display region (P) on the screen corresponds to the view on a schematically illustrated slider control.

9. Method according to Claim 7, characterized in that the planar character (Z) permits a display past a desired value by means of a change in shape, color, or brightness.

10. Method according to Claim 7, characterized in that the planar character (Z) permits a display past a positive or negative deviation from a desired value or a previous value by means of a change in shape, color, or brightness.

11. Method according to one of Claims 1-10, characterized in that the appropriate display value is signified by means of at least one alphanumeric or symbol-like character ($z_{cz}$).

12. Method according to one of Claims 1-11, characterized in that at least one scaling character (Sk) is designated by means of at least one alphanumeric or symbol-like character ($z_{cz}$).

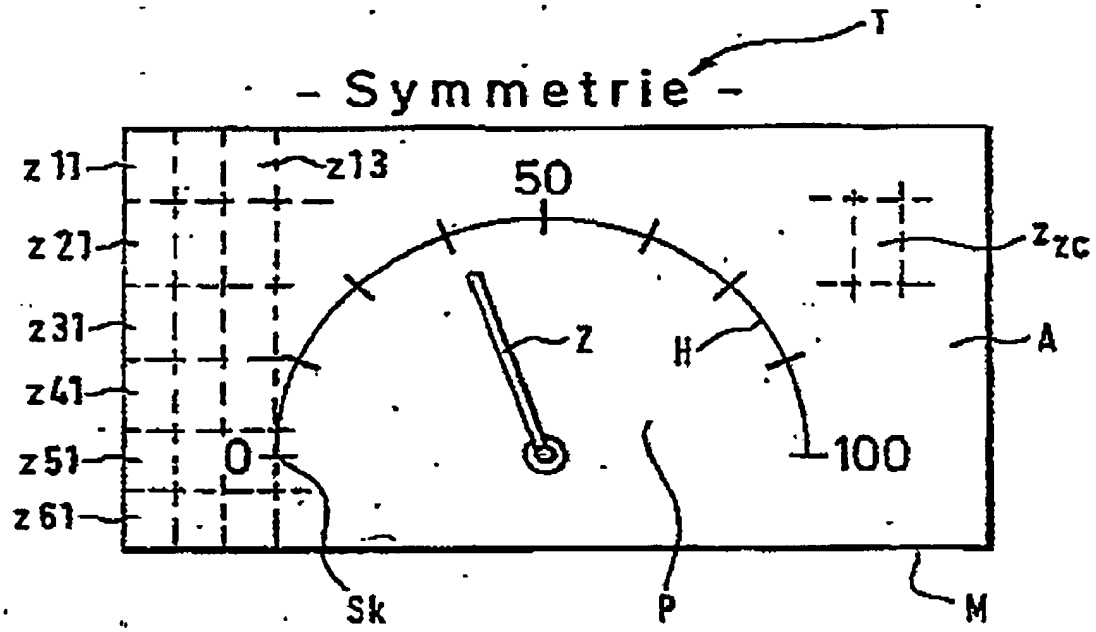



Figure 1

Key: T Symmetry

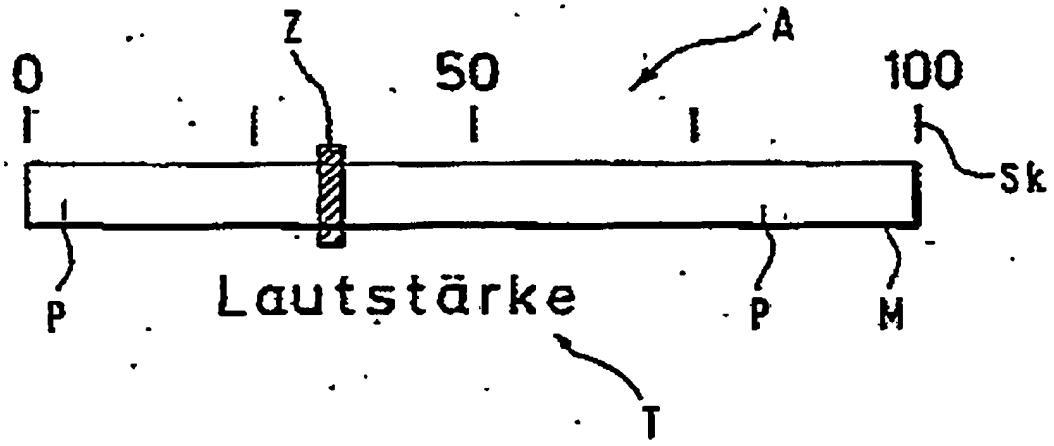



Figure 2

Key: T Volume

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